# Optimus standby ready response times at turn-on, warm-start and tube switch-over

The time to get into a standby ready state is determined by several conditions.

The following examples do not take any system ready response times into account, these might be much longer compared to the generator ready time.

To check the time at which the generator itself is ready start XRGSCOPE and take the following path:

>> Select Unit >> FU-kV >> FU-kV >> Faultfind >> Logging Tables >> Read Trace

The following screen (ready time 18926 ms) was made at a generator with 2 tubes. The response time will be the same with a single tube generator. An audible ready indication is the ENK1 contactor which is energized by kV_control once all units are ready.
The screen will look the same if the generator is turned on or if warm-start has been carried out.
The first lines are always empty at turn-on or warm-start as the timer always starts at zero.

During normal operation the time [ms] table content is any time after turn-on and does not represent any relationship to the generator clock (date/time) setting.

The ready time is almost the same (19092 ms) when the generator is turned on with the 2nd tube selected:

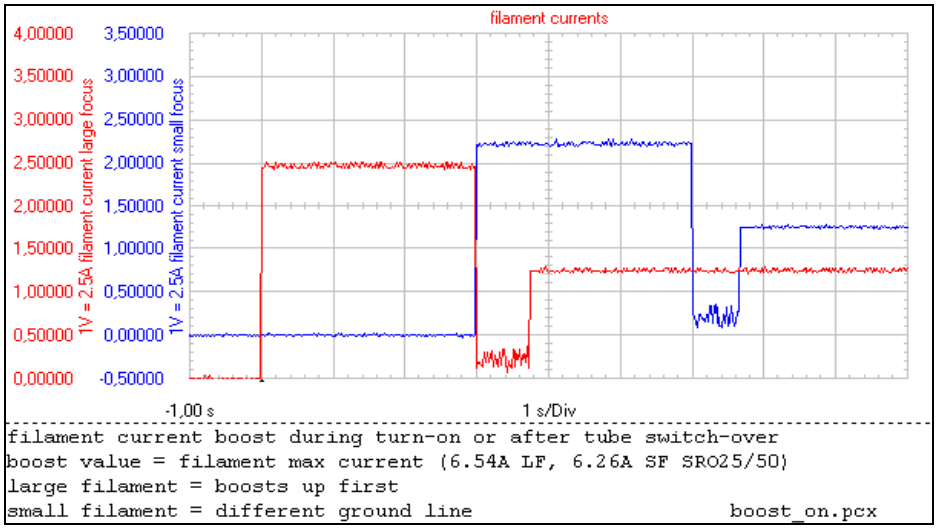
The ready times are much longer if the filaments are not adapted.

The ready time after tube switch-over is also indicated in the screen. The first tube was ready at 18926ms (see screen TURNON1.TDL page 1-3).
At a time of 73580ms the command to switch over to tube 2 was given. The generator was back ready 7484ms later at 81064ms.
It takes some time to turn off the actual filament current of the selected tube 1, to switch over with the high tension switch and the stator contactor, looking for the tables of tube 2, boosting up the filaments and setting the APR parameters which have been active last time.

TURNON2.TDL

| time [ms] | source-id | information |
|---|---|---|
| [ 18543] | [kV-state: | ][normal, standby_not_rdy |
| [ 18654] | [kV-state: | ][normal, standby_rdy |
| [ 18720] | [kV-setpoint: | ][70.00 kV |
| [ 18926] | [kV-setpoint: | ][70.00 kV |
| [ 73580] | [kV-state: | ][normal, off |
| [ 73899] | [tube-switch: | ][2 |
| [ 80869] | [kV-state: | ][normal, standby_not_rdy |
| [ 80870] | [kV-state: | ][normal, standby_rdy |
| [ 80917] | [kV-setpoint: | ][70.00 kV |
| [ 81064] | [kV-setpoint: | ][70.00 kV |

< OK >

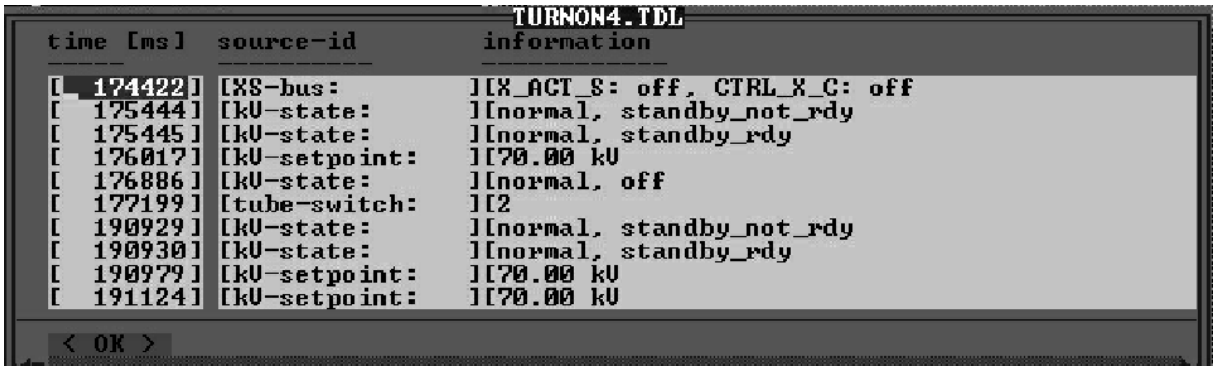



It takes at least 6.7 seconds for the filament circuit to bring both filaments of a tube from cold to standby temperature no matter if at turn-on or tube switch-over.

As one can see on the following screen the switch-over time from standby ready tube 2 to standby ready tube 1 is 7539ms (116532ms-124071ms), close to tube 1 >> 2 switch-over time.

TURNON3.TDL

| time [ms] | source-id | information |
|---|---|---|
| [ 80869] | [kV-state: | ][normal, standby_not_rdy |
| [ 80870] | [kV-state: | ][normal, standby_rdy |
| [ 80917] | [kV-setpoint: | ][70.00 kV |
| [ 81064] | [kV-setpoint: | ][70.00 kV |
| [ 116532] | [kV-state: | ][normal, off |
| [ 116851] | [tube-switch: | ][1 |
| [ 123821] | [kV-state: | ][normal, standby_not_rdy |
| [ 123822] | [kV-state: | ][normal, standby_rdy |
| [ 123869] | [kV-setpoint: | ][70.00 kV |
| [ 124071] | [kV-setpoint: | ][70.00 kV |

< OK >

In case another RGDV and with it the other tube is selected immediately after termination of an exposure it takes more time as the rotor control has to finish braking of the active tube first. Afterwards stator contactors and high tension switch will switch over to the selected tube. kV_control is quickly back ready after termination of the previous exposure, but all other functions have to be carried out which at the end leads to a new data set also for kV_control.
If one starts the switch-over time at 176017ms it takes 15107ms to be in ready condition with another tube.